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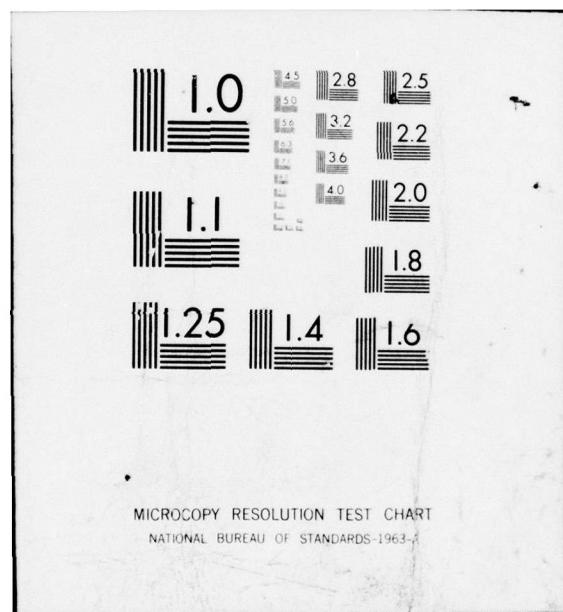
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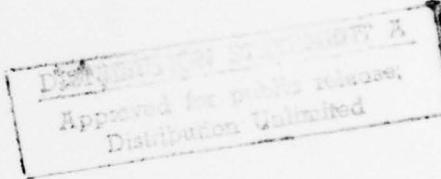
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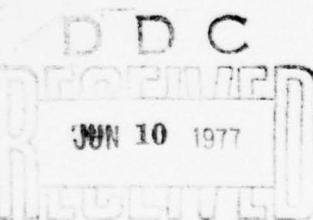
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EUROPEAN SCIENTIFIC NOTES

AMERICAN EMBASSY   LONDON, ENGLAND

FLUORESCENCE METHOD FOR MEASURING SMALL AMOUNTS OF
    URANIUM

        At the Institute for Radium Research, University
of Vienna, Dr. F. Hernegger and Professor Berta Karlik,
Director of the Institute, are perfecting a fluorescence
method for detecting minute amounts of uranium, down to con-
centrations of the order of 10^{-9} by weight.

        It was found that very high sensitivity could be
attained if the uranium is incorporated as a fluorescence
activator in sodium fluoride. Very intense fluorescence is
then observed in the yellow-green region when the substance
is illuminated with ultraviolet light. The sample is first
concentrated by chemical means and then fused into a bead of
about 25 mg of sodium fluoride by melting onto a platinum
wire. A sample corresponding to an original concentration of
uranium of only 10^{-9} produces a very noticeable emission of
light, while a concentration of 10^{-8} gives extremely bright
yellow light.

        Apparatus is nearing completion for measuring
rapidly the uranium content of such beads. The fluorescence
of the beads, which is illuminated by a high pressure mercury
lamp, is viewed through a microscope after passing a light
filter which has a narrow band-pass in the green. This light
is arranged to fill half the area of a circle; its intensity
is compared with that of a standard lamp whose intensity can
be varied accurately by adjusting a slit and which fills the
other half of the circle. The apparatus is calibrated in a
routine manner before and after each determination by viewing
beads whose uranium content is accurately known.

The technique has been applied to various geo-physical problems. Of particular interest at the moment are measurements of the uranium and radium content of different layers of the ocean bottom. The radium content of the samples is determined by measuring their alpha activity. It has been found that in ocean water the radium/uranium ratio has less than the equilibrium value, while in the ocean bottom the ratio is larger than the equilibrium value. By measurements on core samples from the ocean bottom it has been shown that the ratio approaches the equilibrium value as the depth (i.e., geological age) of the sample is increased. At the present time, extensive measurements are being started on core samples of the ocean bottom which are about 12 meters deep and correspond to geological age up to about 10 million years. These samples were obtained in a recent expedition by Professor H. Pettersson of the Oceanographic Institute, Göteborg, who is collaborating with the Vienna group.

POSSIBLE EXISTENCE OF A NEW TYPE OF HEAVY MESON

The event shown in Fig. 1 has recently been ob-served in a nuclear emulsion by Dr. C. O'Ceallaigh of the University of Bristol. A particle K_2 reached the end of its range at the point P and decayed with the emission of a μ-meson of range 1080 microns, corresponding to an energy of 5.91 MeV. The μ-meson came to rest in the same photo-graphic plate and emitted an electron e. The range of particle K_2 in the emulsion is 5900 microns, and its mass as determined by grain-counting and by scattering is 1100 $\pm$ 100 electron masses.

Fig. 1

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The event was at first thought to be an ordinary $\pi-\mu$ decay but because of the exceptionally long range of the μ-meson it was further analyzed, and the unusual mass deduced. After this discovery, about 600 other $\pi-\mu$ decays were more thoroughly investigated, but no other heavy meson decays have been found.

The question arises as to whether the particle K_2 is identical with the heavy meson of mass of about $1300m_e$ observed a few weeks ago and described in ESN 5, 122 (1951). This latter meson is referred to as K_1 by the Bristol group. If K_{2_0} is assumed to undergo a two body decay, i.e., $K_2 \rightarrow \mu + \overset{0}{\nu}$, then the mass of the neutral particle ν is approximately $800m_e$. If this is correct, then K_2 and K_1 are different, since in the K_1 decay the postulated neutral particle has a mass of only $500m_e$. The identity of the two particles thus remains in doubt.

PHOTOCONDUCTIVE CELLS

Hilger and Watts, Ltd. (London) have just announced commercial production of a new photoconductive cell with unusual properties. The cell is the invention of Dr. E. Schwarz of their own laboratory, and has been described briefly in Proc. Phys. Soc., Lond. B, 63, 624 (1950).

The cells now being produced have a sensitive strip of cadmium selenide 10 mm by 0.2 mm mounted on the end of a cylinder 5/8" in diameter, which also serves as a socket for a shielded lead. The sensitivity for light from a tungsten lamp is of the order of 8 or more amperes per lumen. The cells show some sensitivity from the X-ray region all the way to 1.4 microns, with the maximum response peaked sharply at 0.7 microns. The time constant is of the order of a millisecond depending on the light intensity, and the dark resistance is 10^9 to 10^{10} ohms. In one experiment with 7000A radiation interrupted at 800 c.p.s. it was possible to detect 10^{-12} watts using a band width of 1 c.p.s. and a signal equal to the noise.

Under strong illumination the cells show some fatigue, but the effect is less when using a special cell made primarily for strong light.

The operating voltage is chosen according to the light intensity to be measured. In most cases ten volts is

ample and in no case is more than 50 volts or 20 milliamps recommended. At this time the cells are being made primarily for use in spectrographs but should be valuable for a variety of instruments where their remarkable sensitivity can lead to the simplification or elimination of an amplifier. In common with other photoconductive cells, they are most valuable in uses where the light can be focused onto a small area. The use of the cell in the far ultra-violet and X-ray region is still being studied.

SIMPLE AND MIXED METAL HYDRIDES

A number of new simple and mixed metal hydrides have been prepared by Professor E. Wiberg (Munich). Among the simple hydrides, BeH_2, MgH_2, and InH_3 are noteworthy. These were obtained by reaction of the chloride with excess LiH in ether solution. The white powders obtained were not definitely identified as the pure hydrides. They may be mixed hydrides with lithium.

New mixed hydrides include magnesium-, lithium-, beryllium-, indium-, gallium-, zinc-, and tin- aluminum hydrides (typical formula: $Mg(AlH_4)_2$), lithium indium hydride $(LiInH_4)$, magnesium boron hydride $(Mg(BH_4)_2)$, and lithium gallium hydride $(LiGaH_4)$.

The solubility of $Be(AlH_4)_2$ in ethylene suggests the following bridge structure:

$$
\begin{array}{c}
H \quad \quad H \quad \quad \quad H \quad \quad H \\
\diagdown \quad \diagup \quad \quad \diagdown \quad \diagup \\
Al \quad \quad Be \quad \quad Al \\
\diagup \quad \diagdown \quad \quad \diagdown \quad \diagdown \\
H \quad \quad H \quad \quad \quad H \quad \quad H
\end{array}
$$
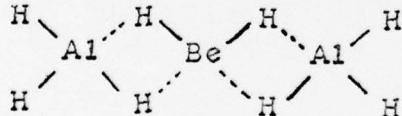
Indium aluminum hydride can be prepared in ether solutions at $-70°C$ according to the reaction:

$$InCl_3 + 3LiAlH_4 \longrightarrow In(AlH_4)_3 + 3LiCl$$
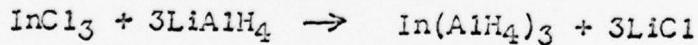
The white $In(AlH_4)_3$ decomposes above $-40°C$:

$$In(AlH_4)_3 \longrightarrow In + 3/2\ H_2 + 3AlH_3$$
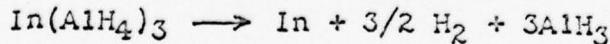
Lithium gallium hydride (LiGaH$_4$) (previously briefly mentioned by Schlesinger et. al.) was prepared in ether solution:

$$GaCl_3 + 4LiH \longrightarrow LiGaH_4 + 3LiCl$$
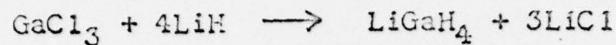
LiGaH$_4$ forms very stable ether complexes, probably as follows:
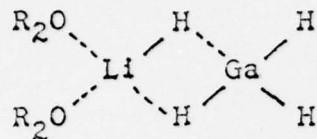
Its ether solution is a somewhat weaker reducing agent than LiAlH$_4$. In contrast to LiAlH$_4$, LiGaH$_4$ does not reduce benzonitrile, benzophenone, or p-hydroxybenzaldehyde.

Further details are to be found in a current series of articles in Zeitschrift für Naturforschung, series B.

AN ENANTIOMORPH OF AN ALIPHATIC HYDROCARBON

Professor Karl Freudenberg, Chemisches Institut der Universität, Heidelberg, is engaged in some experiments on the synthesis of a pure enantiomorph of 3-methylhexane, the simplest aliphatic hydrocarbon capable of showing optical activity. The structure of shikimic acid has been known for a long time, and more recently H.O.L. Fischer established that the configuration of the three asymmetric carbons is as follows:
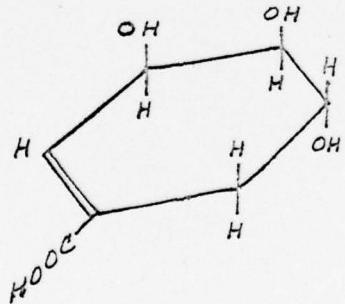
Freudenberg found that saturation of the ethylenic double bond with hydrogen yields dihydroshikimic acid

which has the property that it readily forms a para-lactone. This fact establishes that the carboxyl group has assumed a position on the same side of the "plane" of the ring as the hydroxyl group in the para position. By this means the configuration of the asymmetric carbon atom bearing the carboxyl group becomes known in dihydroshikimic acid.

By conventional procedures the cis-glycol group of the dihydroshikimic acid is protected by reaction with acetone. The third hydroxyl group is then protected by acetylation. After removal of the acetone residue, the cis-glycol is subjected to oxidation (and hydrolysis) leading to the compound:

$$HOOC-CH_2-CH-CH_2-CHOH-COOH$$
$$|$$
$$COOH$$
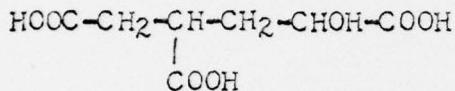
Freudenberg plans to reduce this tricarboxylic acid to a tetra-alcohol by use of lithium aluminum hydride and to convert the tetra-alcohol to the hydrocarbon 3-methylhexane. Since none of the reactions involves a bond to the asymmetric carbon atom, one expects to obtain a pure enantiomorph of this simple hydrocarbon, the configuration of which will be known relative to the sugars.

IRREVERSIBLE THERMODYNAMICS AND THE HYDRODYNAMICS OF LIQUID HELIUM II

I. Prigogine and P. Mazur of the Free University of Brussels have made a theoretical study of the hydrodynamics of liquid helium II by application of the thermodynamics of irreversible processes. Their work is not only a fine example of the usefulness of this thermodynamic method, but also indicates the difference between He II and a mere mixture of two fluids, one of which has vanishing viscosity.

Two different formulations of the hydrodynamics of the system have been developed. Both are based on the extension to a moving system of the Gibbs formula for the entropy change in terms of internal energy and volume changes. In one case, the formula is applied to movement with respect to the center of gravity of the entire system corresponding to statistical equilibrium of velocities of all constituents

with respect to this motion. The Gibbs formula leads to an entropy balance equation which permits identification of an entropy flux and an entropy source expression. Linear relations between the flux terms and the "force" terms in the source expression are then derived and introduced in the equation of motion of the system. This leads only to the classical Stokes-Navier hydrodynamic equations of motion.

In the second case, the formula is applied to the fluid components separately, and the new assumption is introduced that almost no momentum is transferred between the components. This corresponds to an equilibrium velocity distribution around the macroscopic velocity of each component separately. Such an inhibition on transfer of motion should be derivable from the statistics governing the system, but is merely assumed and not derived in their work. The complete form of Gorter's equations of motion for normal and superfluid components, including possible frictional terms then follows. This is in contrast to earlier work of S. de Groot, L. Jansen, and P. Mazur (Physica $\underline{16}$, 421, 691 (1950)) which derived only the equilibrium relations in He II using methods of irreversible thermodynamics.

The dynamics of mixtures of He II with the isotope He^3 have also been studied by this procedure, assuming the He^3 atoms can exchange momentum only with the normal constituent of He II. The resulting generalization of Gorter's equations has successfully been applied to interpret various recent observations on He^3-He^4 mixtures.

CHROMATOGRAPHY OF ENE-DIOLS AND RELATED COMPOUNDS

Professor Friedrich Weygand, Chemisches Institut der Universität, Heidelberg, has developed a new color reagent for use in the chromatographic separation of aliphatic ene-diols, ortho-dihydroxy aromatic compounds, and ortho-quinones. The solution, which contains titanium trichloride, pyridine, and methanol, has been shown to yield a yellow precipitate or color with over 100 compounds of these types. The structure of the yellow compounds is not known, but the characteristic grouping responsible for the reaction is evidently -C(OH)=C(OH)- (an ene-diol). Aromatic ortho-dihydroxy compounds may be regarded as having a similar grouping and ortho-quinones react apparently due to preliminary reduction by $TiCl_3$.

The reagent has been used for the development of paper chromatograms, and the developed papers may be kept for a long period of time without deterioration. Work is underway at present to determine if this method can be used to determine colorimetrically the amounts of the various dihydroxy compounds. It is planned also to develop this method as a means of quantitative determination of ascorbic acid, the determination to be carried out in an atmosphere of H_2S.

RECRYSTALLIZATION NUCLEI IN METALS

Professor W. G. Burgers and his assistant, Dr. T. J. Tiedema, at the Laboratory for Physical Chemistry of the Technical University, Delft, are studying the mechanism of recrystallization in strained metals. Two papers were recently published on this subject, "X-ray Investigation of the Nuclear Spot of Crystals obtained by Recrystallization", by Dr. Tiedema, and "On the Nature of Recrystallization Nuclei and the Origin of Recrystallization Textures" by Burgers and Tiedema (Proc. K. Ned. Akad. Wet. 53, 9 (1950)).

The Formation of Potential Recrystallization Nuclei

When a metal is plastically strained it is characterized structurally by the presence of S-shaped curvatures of the lattice planes in local regions of the order of a micron in size. The radii of these curvatures vary widely and depend on the mode of deformation. In terms of dislocation theory, the deformation has introduced dislocations on the slip planes, and they are predominantly of the same sign in the region of a local curvature of a given sign.

When the metal is first heated, no metallographic changes occur, but the mechanical properties are altered. This phenomenon, called recovery, is explained by two simultaneous consequences of the increased rate of diffusion of the dislocations: the annihilation of pairs of dislocations of opposite sign and the grouping of the large regional excess number of dislocations of the same sign into lines. Regions of curvature of the lattice are converted into groups of less highly strained polygonal elements.

If the local curvatures are sufficient the lines of dislocations extend far enough to form closed polygonal elements (perfect polygonization). The degree of the local curvatures in a piece of metal and therefore the perfection of polygonization are not only related to the microscopic

strain but also to the manner of straining. For example, Dr. Tiedema has succeeded in straining an aluminum crystal in tension by 24 percent without introducing as much distortion as is usually found after less than 10 percent strain. The technique he used was to align the crystal initially in such a way that deformation took place only by duplex slip. This crystal did not recrystallize and showed very little asterism, indicating the absence of any marked local bending.

The Nature of Potential Nuclei

Dr. Tiedema has applied a variant of the Laue method of X-ray diffraction analysis to the study of recrystallization nuclei. This technique, first described by Guinier and Tennevin, consists of letting a polychromatic divergent beam of X-rays, originating from a very small focal spot, fall on a distant specimen. The film is placed near the specimen so that the recorded diffracted spot is out of focus. The spot is then an "image" of the irradiated part of the specimen, with those parts which have different orientations displaced with respect to one another. The method was applied to aluminum sheet, cold rolled and then heated for a few minutes at 690°C to form recrystallized grains 0.5-6 mm in diameter. Since the publication of the papers referred to above, Dr. Tiedema has perfected his apparatus (in particular the fineness of the focal spot) so that he can now obtain clear detailed images of the fine structure of these new grains.

From the results of his experiments, the nature of potential recrystallization nuclei can be pieced together. They are evidently made up of groups of perfectly polygonized blocks, differing in orientation by about one degree or less, the group as a whole being at some 30° or 40° from neighboring blocks. They are therefore presumed to be formed at the points of inflection of the local S-curvatures described above.

The Growth of Recrystallized Grains

The groups of polygonized blocks have been called "potential" nuclei by Cahn. According to the Delft scientists, they do not become "actual" nuclei unless they have reached a sufficiently strain-free state by the completion of polygonization, and unless they are surrounded by more highly

strained regions. In addition, the regions surrounding a potential nucleus must have a sufficiently different orientation and must not be in twin relationship with it. Such conditions are most easily found at the points of inflection of polygonized S-curvatures. If these conditions are met, one or more of the polygonized blocks forming the nuclear group can grow. Dr. Tiedema has found several instances in which three or more such blocks have grown side by side, separated by plane boundaries. The less favorably oriented blocks of the group grow disproportionately slowly. Since the latter have so nearly the orientation of their fellows, they are not absorbed by them and remain visible as fine structures in the out-of-focus Laue spots.

Selective Growth versus Oriented Nucleation

The Delft scientists, armed with this array of experimental data, are taking an active part in the controversy concerning the formation of recrystallization textures. Their stand is that if the deformation process produces potential nuclei in all possible orientations which reach the necessary strain-free state at nearly the same time (same incubation period), then the final texture is governed by their rate of growth. But if poorly oriented potential nuclei become active soonest or exclusively, or if deformation is such that none are present in the most favorable orientations for growth, then the final texture is dictated by the orientation of the most active nuclei. Several experimental findings not easily explained by the growth-selectivity theory alone are more easily understood on this basis.

THE ROLE OF TEMPERATURE IN THE SLIP PROCESS

A group under the direction of Professor E. N. da C. Andrade, Director of the Royal Institution, London, is studying the plastic deformation of metals with particular emphasis on the effect of temperature. The general conclusion from this work is that slip is easier to initiate at low temperatures but harder to continue, while at high temperatures the opposite is true.

The investigation has been done with single crystal specimens of gold, silver, and nickel. The results obtained with gold are considered the most reliable, since silver tested in air was shown to be affected by the atmosphere, and the available nickel was less pure than the other two metals.

The results of tensile tests on gold crystals at various temperatures can be generalized by saying that whatever the temperature there is a stage of easy slip when the slope of the stress-strain curve is low, and that this stage is reached more quickly at low temperatures than at high. Schematically, this behavior may be illustrated as follows:
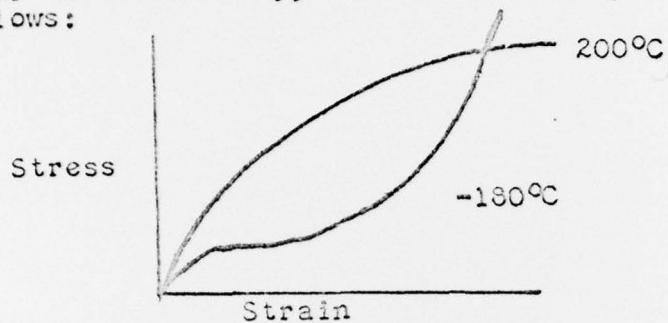
The slope of the stress-strain curve varies with temperature in a manner dependent on the particular value of strain considered. At low strains (of about 5-10 percent), the slope is low at low temperatures, increases to a maximum, and then falls off again at high temperatures. This strain region is interpreted as one in which slip planes are being formed, increasing thermal agitation acting to make their formation more difficult, while high temperatures promote slip on existing planes. This view is supported by the well-known fact that slip planes are more widely spaced at high temperatures than at low.

At high strains (of about 30-40 percent), the slope of the stress-strain curve decreases continuously in the manner that would be expected as the temperature is raised. At these values of strain, slip is considered as proceeding on already established slip planes, a process which is promoted by an increase in temperature.

The slip process is thus viewed as a two-stage one, in which slip must first be initiated and then continued; only the latter of these two stages is promoted by high temperature.

Experiments on silver show the same general trend but are complicated by the effect of different atmospheres. Silver tested in air always shows a greater rate of strain hardening than silver tested in an inert atmosphere. This effect persists even at high temperatures, even though silver

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oxide is unstable above about 200°C. It is suggested that the greater hardening rate in air is due not to a bulk oxide layer but to oxygen dissolved in the lattice in such a manner as to impede the movement of dislocations.

Laue photographs were made at various stages during the tensile tests and a linear relation was found between the amount of asterims and the stress for both gold and silver specimens. A connection is thus established between asterism and strain hardening, and both may be expected to be results of the same process.

Critical Stress for Slip and Twinning

Experiments are also in progress at the Royal Institution on the critical shear stress required for slip and twinning in single crystals of cadmium. Particular attention is being paid to obtaining slip without twinning and vice versa; the influence of wire size on the critical shear stress is also being investigated. Preliminary work agrees with that of previous investigators in that decreased wire size, in the range up to one millimeter, is found to increase the critical shear stress for slip.

An interesting variant of crystal growth has been found in these experiments. Some of the "single" crystal specimens prepared by the Andrade method were found by X-ray examination to be actually bicrystals, disoriented by about one degree relative to one another. The disorientation took the form of a rotation about the wire axis. These crystals were always harder or softer than single crystals, and recognition that many of the samples were bicrystals explained practically all of the scatter in the critical shear stress determinations, a scatter previously unexplained.

Creep of Polycrystalline Lead

The transient creep of polycrystalline lead is also being investigated at the Royal Institution. This work is now in a preliminary stage, but results obtained to date show that the outside layers of a specimen behave in a different manner than the interior. The surface has a lower creep strength, and X-ray examination shows that the interior can recrystallize without the surface doing so. It is felt that there is less boundary interference at a free surface and thus easier creep. Attempts will be made to isolate this surface aspect of creep by applying a soft metallic coating, probably of antimony, to

the specimen surface, thus eliminating the free surface of the lead specimen but adding very little to the creep resistance.

The general plan of investigation of transient creep will involve examination of the specimen at various stages during the creep test by three different methods:

(1) X-ray diffraction
(2) Measurement of internal friction
(3) Measurement of stress relaxation at constant strain

In all of this work, particular attention is being paid to the surface effect mentioned above.

THE FERRANTI COMPUTER AT MANCHESTER UNIVERSITY

During the week of July 9, the University of Manchester held an inaugural conference celebrating the completion and installation of its new high-speed electronic computing machine. This machine was built for the University by Ferranti, Ltd., and uses commercially engineered components but follows the design developed at the University. As such, it is the first commercially available automatic high-speed computer in Europe, and the first one on the market generally to include an electrostatic memory. At present, two additional machines are being built by Ferranti, of which one, for the use of Ministry of Supply agencies and to be located at the Armament Research Establishment, Fort Halstead, is almost completed. The other one is expected to remain at Ferranti's to assist their staff in further research and development. The cost of the computer is about $140,000.

Design Features

A few design features of the machine have been pointed out (ESN 5, 154 (1951)) and a more complete description, together with a broad outline of its prospective computing program, will be found in Nature 168, 95 (1951). Some of the points bear stressing in comparison with American computer designs. One of these is the basic pulse rate of 100 kilocycles, rather than the megacycle rate of U.S. machines employing electrostatic storage. The components are therefore operating for the most part comfortably within their designed ranges, and it was felt unnecessary to make provisions for

marginal checking. Even more important is the structure
of the internal memory around which the machine is built.
The difficulties arising from the nearly two orders of
magnitude difference in access speed between the Williams-
tube storage and the magnetic drum backing it up are
greatly reduced by making transfers infrequently and then
only in quanta of an entire tube's worth of information
(1280 digits, equivalent to the contents of half a track
on the drum). Access time to the electrostatic memory is
governed by the latter's regeneration rhythm which controls
the operation of the entire machine. Consecutive periods
of 240 microseconds each are used alternatively for regen-
eration of the information in the memory tubes and for
reading information out of or into them. The regeneration
periods are used to scan in orderly fashion half-line after
half-line, taking 256 such periods to make one complete
round of the store. Since information becomes available in
groups of 20 bits, rather than complete words of 40 digits,
the operating rhythm of the machine is one of "bars" each
containing four "beats" of which two are used for scanning
and two for action. In this respect the Ferranti machine
differs from the prototype whose basic bar contained two
beats of 450 microseconds each, allowing to scan or to
process an entire line at a time.

Multiplication

In all of these respects the design has sacrificed
computing speed for engineering ease and reliability. A
notable and successful exception is the multiplier, which at
a deliberate increase in complexity of design achieves a
multiplication time but little more than twice the addition
time. Multiplication is effected by accumulating simultaneously
as many multiplicands as there are ones in the multiplier,
each delayed by as many pulse lengths as the position of the
one to which it corresponds indicates. Thus machine time for
a problem can no longer be estimated exclusively in terms
of the number of multiplications required.

Operation

The machine has been in operation during the past
month on a wide variety of test problems and its reliability
has been steadily improving. With the early elimination of
errors due to drifting adjustments, especially in the cathode
ray tube storage, the one remaining serious cause of mal-
functioning is the failure of tubes, now occurring about two

or three times a week. A further reduction by one or two orders of magnitude in this failure rate is anticipated as the first generation of tubes, maltreated during early test runs, is eliminated. In addition a test procedure has been developed which, in case of a tube failure in the arithmetic units, especially the multiplier, will stop the machine and lead to the identification of the faulty tube. Considerable facilities for manual interference and inputs, optional stops and monitoring tubes are provided on the console allowing an error analysis right on the machine.

THE USE OF MACHINES IN NUMBER THEORY

There was considerable discussion at the Manchester meeting mentioned above of the use being made of European high-speed computing devices for the solution of number theoretical problems. Investigations of the primality of Mersenne numbers, first at Manchester and later at Cambridge, have recently been turned into a simple search for large primes; the largest one obtained and currently presumed to be the record is $180 (2^{127}-1)2+1$. A program developed in this connection for checking the primality of large numbers has proved to be an excellent routine for testing the correctness of machine operation.

In a different context Professor M.H.A. Newman of Manchester University showed how partial, statistical information could be obtained for certain types of algebraic problems at a reduction of computational effort, spelling the difference between manageability and unmanageability on modern high-speed computing equipment. Thus, it may be out of the question to determine all equivalence classes arising in a set of very many elements under a given equivalence relation, but it may be quite possible to produce a collection of such classes for which the probability is, say, less than 10^{-3} that a class has been omitted which contains more than 1/10 of the average number of elements. The exploitation of information of this character in combinatorial-algebraic settings is in large measure an unsolved problem, but undoubtedly one of both mathematical as well as practical interest, the latter in such connections as information theory, cryptanalysis, etc.

TUBERCULOSIS CHEMOTHERAPY

A colloquium on the chemotherapy of tuberculosis was held July 10-13, 1951, at Dublin, Eire, sponsored by the

Medical Research Council of Ireland under the chairmanship of Dr. Vincent C. Barry, Director of the Laboratories of the Medical Research Council in Trinity College, Dublin. There were about 75 members in attendance with prominent research workers from Europe, the United States, Africa, and the British Isles. Papers were presented on chemical, pharmacological, and clinical problems.

Dr. Barry reported the development of a new therapeutic agent potentially useful against tuberculosis. This compound is a phenazine, 2-anilino-3-imino-10-phenylphenazine
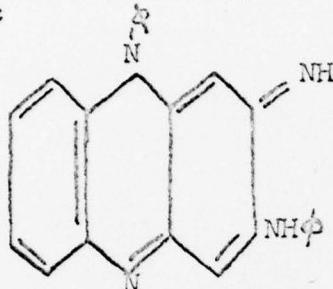
coded as B.283. This compound has not been tried in cases of tuberculosis but has been used on lepers. Dr. Joseph Barnes of Belfast, Medical Officer of the leper colony at Ogoja, Nigeria, reported trials of B.283 in 10 cases of nodular leprosy with very promising preliminary results. The only serious side effect was liver damage, without jaundice, which was adequately controlled by interrupting the treatment.

The chemistry and biochemistry of the tubercle bacillus was discussed by Edgar Lederer, Institut de Biologie Physico-Chimique, Paris. In addition to a comprehensive review of the work of various investigators, he discussed the relationship between chemical composition and virulence. The importance of exploring this phase in the search for therapeutic agents was emphasized.

Thiosemicarbazone treatment of tuberculosis was discussed by Gerhard Domagk, Professor of Medicine at the University of Münster, Germany. Recently he has been concentrating on a benzaldehyde derivative, designated as Conteben, which shows greater bacteriostatic activity against the tubercle bacillus in vitro than streptomycin or paraaminosalicylic acid. Conteben is more effective in the human and in the guinea pig when combined with streptomycin.

Clinical experience to date on Conteben was reviewed together with very convincing evidence of its benefit in skin and pulmonary lesions. The manifestation of liver necrosis as it applies to therapy was discussed. The uses of PAS and streptomycin in connection with Conteben were presented and evaluated.

TREATMENT OF EXOPHTHALMOS

Dr. H. Pierre Klotz, working at the Hopital Bichat, Paris, in the clinic of Justin Besancon, has had the opportunity to treat a number of cases of exophthalmos by three different methods: X-irradiation of the pituitary gland; a new drug named phrenatol (para-hydroxy-propiophenone); and an estrogen (hexoestrol). The six cases which were treated with phrenatol did not show reduction of the exophthalmos.

Three cases which were treated with X-irradiation gave in one instance complete and in two cases a marked reduction of the exophthalmos. The dosage of X-irradiation was similar to that used for tumors of the pituitary gland or to treat acromegaly, namely a total of 3,000r divided into 12 treatments given in six weeks. There is a delay, according to Dr. Klotz, of approximately 10 to 15 days before any reduction in the degree of exophthalmos can be expected. This delay must be allowed for in evaluating the treatment by X-irradiation before beginning subsequent treatment.

During the past year there have been opportunities to treat six cases of exophthalmos, four females and two males, with an estrogen (hexoestrol). Two or three of the females were post-thyroidectomy cases. The two males were hyper-thyroid cases of exophthalmos. Five to 10 milligrams of hexoestrol were given per day with, in all cases, marked improvement of the exophthalmos. According to Dr. Klotz, treatment with estrogen is the one of choice and may be combined with X-irradiation of the pituitary.

SUMMER SCHOOL OF NUCLEAR EMULSION TECHNIQUES

The Center of Nuclear Physics of the University of Brussels is organizing a summer school to be held 7-15 September on the techniques applied in the use of photographic emulsions in nuclear physics. Lectures will be given by members of the Center including Professors Occhialini and Cosyns. Requests for admission should be made directly to the Center.

The lectures will cover the following subjects: nuclear emulsions, fading, processing, size changes, distortion, specific ionization, scattering, magnetic deflection, microscopes, application to cosmic rays, application to low energy particles, and other applications.

CONGRESS ON ASTRONAUTICS

The British Interplanetary Society has completed arrangements for the 2nd International Congress on Astronautics, to be held in London from September 3-8, 1951. The proceedings will be held at Caxton Hall, London, S.W.1.

The first part of the Congress will be procedural and open only to delegates from a number of European and American Societies. Its main business will be to inaugurate formally the International Astronautical Federation and to discuss plans for a 1952 Congress. The second part of the Congress will consist of a series of technical sessions open to the public, at which a number of papers on the general theme of the earth-satellite vehicle will be read. The technical sessions will take place on September 6 and 7.

PERSONAL NEWS ITEMS

The new director of the Swedish Jernkontoret is Mr. Sven Fornander. He replaces Dr. Tigerschiöld, who has taken an industrial position at the Grängesberg-Luossavaara-Kiirunavaara Co.

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Professor Axel Hultgven is retiring this year from his position as head of the Division of Metallography, Royal Technical University, Stockholm.

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The Harveian Orator of the Royal College of Physicians, London, for 1952 is to be Lord Moran. Dr. R. R. Bomford will be Bradshaw Lecturer.

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The Royal College of Physicians has recently awarded the Moxon Medal to Dr. A.W.M. Morris, the Weber-Parkes Prize to Dr. P. M. D'Arcy Hart, and the Baly Medal to Prof. G. de Hevesy.

A Second Physical Institute has been established at the University of Heidelberg. The Director of the new Institute is Professor Otto Haxel, formerly at Göttingen. The new Institute will be concerned with the study of nuclear physics and cosmic rays.

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Dr. David R. Bates has left the Physics Dept. of University College, London, to become Professor at Queens University, Belfast. He will continue his work on the upper atmosphere and astrophysics.

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Dr. A. L. Hodson of the cosmic ray research staff of the University of Manchester will spend the coming year at Princeton University.

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Dr. D. H. Wilkinson of the Cavendish Laboratory, Cambridge, has recently gone to Cornell University, where he will spend the next few months. He will be concerned with interpretation of his experiments on photo nuclear reactions.

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Dr. W. E. Burcham is leaving the Cavendish Laboratory, Cambridge, to become Professor of Experimental Nuclear Physics at the University of Birmingham. He will be associated with the synchrotron accelerator project there. Professor B. P. Moon has taken the position vacated by Oliphant, who has returned to Australia.

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Dr. Ugo Camerini has left the cosmic ray group of the University of Bristol and will spend the coming year at the Center of Nuclear Physics, University of Rio de Janeiro, as a research professor under the auspices of UNESCO.

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Dr. C. Peyrou of the cosmic ray group of Professor Leprince-Ringuet, Ecole Polytechnique, Paris, is planning to spend the coming year at MIT, where he will continue cosmic ray research.

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The Medal of the Society of Chemical Industry
has been awarded to Professor E. C. Dodds of the Courtauld
Institute of Biochemistry, Middlesex Hospital, London.

FORTHCOMING EVENTS

The following meetings are considered to be of
future interest to American scientists:

Date	Meeting	Place
12-14 Sept	Intnl Union against T.B.	Paris
26-30 Sept	Intnl Meetings on Light	Paris
30 Sept- 3 Oct	Symposium on Influence of the Hypophysis and Adrenal Cortex on Biological Reactions (Swiss Academy of Medical Sciences)	Zurich
22-27 Oct	Journées Métallurgiques d'automne (Société Française de Métallurgie)	Paris

Prepared by the Scientific Staff
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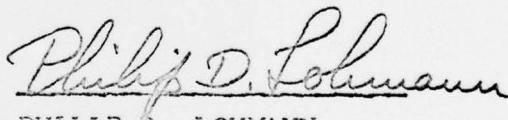
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